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EXAMINER	
MENEFEE, JAMES A	
ART UNIT	PAPER NUMBER
2828	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/827,764	Applicant(s) LIU, GANG
	Examiner James A. Menefee	Art Unit 2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 May 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

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Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Applicant's request for reconsideration , filed 2 May 2003, of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn. An action follows, taking into consideration the after-final amendment previously filed 31 March 2003. The amendment is now entered.

Response to Amendment

In response to the amendment filed 31 March 2003, the specification and claims 2, 8 and 12-13 are amended. Claims 1-14 are pending.

The declaration filed on 31 March 2003 under 37 CFR 1.131 is sufficient to overcome the Pfaff reference.

Drawings

The corrected or substitute drawings were received on 31 March 2003. These drawings are acceptable.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in

> section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claim 12 is rejected under 35 U.S.C. 102(b) as being anticipated by Sprague et al. (previously cited US 5,138,340). Sprague discloses a method of controlling a laser diode comprising activating a control circuit including a laser diode at a current below the laser activation threshold, increasing the current above the laser activation threshold to activate the laser, and reducing the current below the laser activation threshold to deactivate the laser. There are operating temperature control means, the auxiliary heater, that maintain an output wavelength of the laser diode within a predetermined range. (abstract).

Claim 14 as taught and understood is rejected under 35 U.S.C. 102(b) as being anticipated by Rudd et al. (previously cited US 5,821,527). Rudd discloses a laser diode control circuit including a p-channel MOSFET connected to the power input of said circuit. The claimed property, that the MOSFET allows the pre-selected input power polarity to pass and turns off if the opposite polarity is received, is inherent. When the structure recited in the claims is identical to the prior art, claimed properties and functions are presumed to be inherent. This statement is functional language, which cannot serve to distinguish a claim form a reference since it does not define any structure. See *In re Mason*, 244 F.2d 733, 114 USPQ 127 (CCPA 1957). The functional language is deemed inherent.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jing et al. (US 6,178,188) in view of Takigawa et al. (US 6,097,744). Jing discloses a laser driver for generating coherent light comprising a laser diode 112 mounted in combination with a single thermoelectric temperature control means 90, and a microprocessor 602 for controlling and/or monitoring the activation of said laser diode 112 and said thermoelectric temperature control means 90. It is disclosed that the laser diode 112 may be a laser diode array, thus there are at least two laser diodes. It is not explicitly disclosed that the laser diodes operate simultaneously. However, it is well known that the laser diode elements of a laser diode array may operate simultaneously. See Takigawa (col. 24 lines 51-54). It would have been obvious to one skilled in the art to cause the laser diodes to operate simultaneously, as this leads to a simpler design as one drive source and set of electrodes is needed to operate all of the lasers, as is well known.

Claims 2-7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freitag et al. (previously cited US 5,999,549) in view of Jabr (previously cited US 5,594,748), and further in view of Noda et al. (previously cited US 6,229,833).

Regarding claim 2, Freitag discloses a method of controlling/monitoring a laser diode comprising power safety parameters, pulse output power and pulse duration and disabling the

laser diode if the power safety parameters are exceeded (whole detailed description, esp. col. 3 lines 25-39). It is not disclosed that the system includes a microprocessor and that power safety parameters are stored in a memory of a microprocessor. Jabr teaches a laser driver system where a microprocessor controls the driving of a laser and also stores in memory limits for parameters of the laser diode, that when passed, would cause failure of the operation of the laser (abstract). It would have been obvious to one skilled in the art to include a microprocessor and to store the limits of the parameters in memory of the microprocessor because the microprocessor can control the entire system, and the microprocessor must know when to shut down the laser or sound an alarm, and therefore should know when parameters of laser operation are exceeded, as taught by Jabr. It is not disclosed that there is continuous monitoring of the parameters. Noda teaches in Fig. 1 a means for monitoring an output from a laser diode, and a laser protection circuit having a comparator that compares the current through the laser to a predetermined current, and disables the current to the laser when the current exceeds the predetermined current (col. 7 lines 5-55). It would have been obvious to one skilled in the art to include such a part so that the laser diode is not damaged by the excessive current, as taught by Noda. Monitoring by the comparator will be continuous.

Regarding claim 3, it is inherent that the operation of the laser diode may be re-enabled upon the occurrence of a predetermined contingency, i.e. when the cause of the fault is no longer present.

Regarding claim 4, Freitag discloses that the safety parameters may be output power and pulse duration (col. 3 lines 25-39).

Regarding claims 5-6, it is inherent that that microprocessor would record the output power and the laser pulse start and stop times, as these are the parameters that are being measured.

Regarding claim 7, it is not disclosed that the microprocessor extrapolates a curve based on the parameters stored in the memory for determining the parameter limits. It is well known that microprocessors may extrapolate a curve using previously known points. It would have been obvious to one skilled in the art that this microprocessor may do so should the parameter limits not be previously given, so that the microprocessor will know what values the parameters may be for proper operation, as is known.

Regarding claim 13, Frietag and Jabr teach as in the rejection of claims 2-7 above a laser driver control system comprising a laser diode and a computer monitoring the pulse frequency and duration of the laser diode and means to disable the laser diode if predetermined values are exceeded. There is not taught a comparator for continuously measuring the current through the laser diode and comparing it to a predetermined current, and disabling the system if the current exceeds the predetermined value. Noda teaches in Fig. 1 a laser protection circuit having a comparator that compares the current through the laser to a predetermined current, and disables the current to the laser when the current exceeds the predetermined current (col. 7 lines 5-55). It would have been obvious to one skilled in the art to include such a part so that the laser diode is not damaged by the excessive current, as taught by Noda. There is further not taught a power control loop including the parts of the driver control system where the microprocessor verifies the operation of the components and disables the laser if any components are not operating. It is well known to disable a laser if it is found that the parts are not operating. It would have been

obvious to one skilled in the art to disable the laser if the parts are not operating so as not to damage the laser and its components, as is well known. It is not explicitly taught that the disabling is done at predetermined product values of pulse magnitude and duration. However, given the broadest interpretation, the fault point of these references will necessarily be a predetermined product value of pulse magnitude and duration.

Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chambers et al. (previously cited US 5,872,624) in view of Underwood, Jr. et al. (previously cited US 5,816,535).

Regarding claim 8, Chambers discloses a laser driver control system comprising a microprocessor 50, at least one laser driver 20 and a corresponding laser diode 15A. It is not disclosed that the parts are on a printed circuit board or that there is a serial communication between the microprocessor and laser driver. There are temperature control means (see Figs. 4, 4A, 4A-2) for controlling a temperature of said laser diode within a predetermined range. The microprocessor is disclosed as controlling the entire system. Thus the microprocessor will necessarily set a temperature at which the temperature control means should operate to get the desired wavelength, i.e. a set point temperature. There is also not disclosed a second, remote microprocessor. Examiner takes Official Notice that it is well known to place parts of a circuit on a printed circuit board. It would have been obvious to one skilled in the art to include all of the items of the driver control system on a printed circuit board because then all of the parts are organized together, power may be provided to all parts at the same time, and communication between the parts is more easily accomplished than if they were on separate boards, as is well

known. While a serial communication between microprocessor and laser driver is not disclosed, it is well known that such communication may be serial, and it would have been obvious to one skilled in the art to make such a serial communication because then the communication is provided directly from the processor to the driver, as opposed to a parallel connection, as is well known. Underwood teaches circuitry having two microprocessors (col. 5 lines 41-61). It would have been obvious to one skilled in the art to include a second microprocessor in Chambers' system, because the second microprocessor may be used as a backup in the instance that the first microprocessor fails, as taught by Underwood. While one may argue that Underwood is non-analagous art, since it is not at all related to a laser control system, Underwood does disclose circuitry comprising a microprocessor, and teaches a way to improve a circuit having a microprocessor. As Chambers' system includes a microprocessor, one skilled in the art would look for ways to improve a system with a microprocessor, and therefore would look to Underwood.

Regarding claims 9-10, Chambers discloses a TEC, but not a heat sink connected to the TEC. Examiner takes Official Notice that it is well known to include a heat sink with a TEC in laser diode driver type systems because the heat sink will work in conjunction with the TEC in order to accomplish the goal of stabilizing the temperature, as is well known.

Regarding claim 11, Chambers discloses a plurality of laser diodes, but not a plurality of drivers. It would have been obvious to include a plurality of drivers rather than the single driver if one wanted to control each of the plurality of laser diodes independently, as is well known.

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are not persuasive. Applicant made the following arguments:

1. Argument against the rejection of claim 1 as being anticipated by Pfaff.

2. Argument against the rejection of claim 12 as being anticipated by Sprague.

3. Argument against the rejection of claim 14 as being anticipated by Rudd.

4. Argument against the rejection of claims 2-7 as being obvious over Frietag in view of Jabr and further in view of Noda.

5. Argument against the rejection of claim 13, also as being obvious over Frietag in view of Jabr and further in view of Noda.

6. Argument against the rejection of claims 8-11 as being obvious over Chambers in view of Underwood.

Argument 1 is persuasive in that the declaration obviates the use of Pfaff as prior art. The rejection is withdrawn.

Regarding argument 2, applicant contends that Sprague does not disclose controlling the temperature of the diode to keep laser output wavelength within a predetermined range. Applicant states that since Sprague controls the temperature in order change the laser output wavelength, then Sprague does the opposite of what applicant claims. The Examiner disagrees. Regardless of whether or not Sprague is changing the output wavelength, the temperature changes disclosed by Sprague will yield output wavelengths that will change by up to 60 angstroms. Thus, the output wavelength is kept within a predetermined range, i.e. within 60

angstroms of the first output wavelength. It does not matter that "Applicant's design seeks to minimize wavelength fluctuation" because no such limitation has been claimed.

Regarding argument 3, the limitations of the claim "which allows...is received." Are deemed to be functional language. As shown in the above rejection, functional language cannot be used to distinguish a claim from the prior art. All of the structural limitations are met by Rudd. The only structural limitations of the claim are that there is a p-channel MOSFET connected to a power input of a circuit. This is met by Rudd.

Regarding argument 4, regarding the argument that the specific parameters taught by applicant are not taught, Examiner contends that these parameters are taught in col. 3 lines 25-39 of Freitag. See the rejection above. Regarding the arguments that Freitag does not teach monitoring, Noda is relied upon to teach the monitoring. Regarding the argument that Noda does not teach continuous monitoring, the Examiner contends that the comparator will always be comparing the output of the power monitor with the reference voltage, and thus the monitoring will be continuous. The applicant has done nothing to shift the burden of proof back upon the Examiner, other than simply asserting that the monitoring will not be continuous. The argument regarding claim 4 was addressed in the previous office action and the examiner holds the same position.

Regarding argument 5, the arguments are drawn solely to newly added features. These features are addressed in the rejection of claim 13 above.

Regarding argument 6, applicant argues that neither Chambers or Underwood teach the added limitations of temperature control means for preventing a temperature change above a predetermined range, and wherein the host microprocessor is programmed to set a set point

temperature of the temperature control means. The Examiner disagrees. The claims do not prevent that the temperature of the diode be varied, only that it must be varied within a predetermined range. Taking the broadest interpretation of the claim, the temperature of Chambers could easily fall within any predetermined range. Also, as shown in the rejection above, the microprocessor controls all of the elements of the system, and thus must control the temperature control means as well. In controlling this element, the microprocessor will set a temperature that the temperature controlling means should operate at, i.e. the set point temperature. Further, the Examiner need not even consider this limitation, the "wherein" limitation. This limitation is a functional statement that does not further define any structure of the device. See *In re Mason*, cited above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lofthouse-Zeis et al. (US 5,754,574) discloses a laser system that is temperature stabilized, and makes use of a temperature set point as in claim 8.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Menefee whose telephone number is (703) 605-4367. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Ip can be reached on (703) 308-3098. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

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JM
May 8, 2003